

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

CONSTRUCTED WETLAND

(Acre)

CODE 656

DEFINITION

A wetland that has been constructed for the primary purpose of water quality improvement.

PURPOSE

This practice is applied to treat waste waters from confined animal operations, sewage, surface runoff, milkhouse wastewater, silage leachate, and mine drainage by the biological, chemical, and physical activities of a constructed wetland.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where runoff is contaminated by metals, pesticides, nutrients, fertilizers, sediments, or animal wastes to levels unacceptable for downstream receiving waters.

This practice applies to the treatment of a wastewater discharge stream (confined animal facilities, food processing, mine drainage, and other constant inputs) or nonpoint source runoff discharges (agricultural, urban stormwater).

This practice is applicable only if the constructed wetland can provide the intended water quality treatment.

This practice does not apply to Conservation Practice Standard 657, Wetland Restoration, intended to rehabilitate a degraded wetland where the soils, hydrology, vegetative community, and biological habitat are returned to original conditions; 659, Wetland Enhancement, intended to rehabilitate a degraded wetland where specific functions and/or values are enhanced beyond original conditions; or 658, Wetland Creation, for creating a wetland on a site location which

historically was not a wetland, or was a wetland with a different hydrology, vegetation type, or functions that occurred naturally on site.

CRITERIA

General Criteria

- Waste water from all confined animal feeding, sewage treatment, or milkhouse operations must be treated in a lagoon or waste storage pond prior to discharge into a constructed wetland.
- The landowner shall obtain necessary local, state, and federal permits that apply before wetland construction, including water rights if required.
- The design will comply with local, state, and federal permit requirements.
- The soil, hydrology, and vegetative characteristics of the site and its contributing watershed before construction shall be documented.

Criteria for Wetland Hydrology

- The constructed wetland area must have sufficient detention volume to provide the necessary hydraulic retention time in the wetland and the overall monthly water budget.
- Release of the treated water must be provided in preparation for receiving the next storm runoff and/or wastewater stream. The storage volume, detention time, and release rate must be compatible with the space available for the constructed wetland and bypass waterway.

- Where significant sediment and organic debris are expected in the wastewater to be treated, provisions for its entrapment before entry into the wetland must be provided. The minimum detention storage volume in the sediment basin shall be routed 25-year, 24-hour storm.
- An adequate investigation of soils to a minimum depth of 10 feet below the proposed bottom of the wetland shall be done to determine the permeability rate. A soil or synthetic liner shall be installed where there is a potential for exchange or mixing of wastewater and ground water.
- The standards and specifications for Dike (356), Waste Storage Facility (313), and Structure for Water Control (587) will be used as appropriate. Refer to the Engineering Field Handbook, Chapter 13, "Wetland Restoration, Enhancement, and Creation," and Chapter 6, "Structures," for additional design information. Existing drainage systems will be utilized, removed, or modified as needed to achieve the intended purpose.
- Design Storm: The constructed wetland system shall be designed to contain a 2-year storm runoff plus the rainfall from the 25-year, 24-hour storm that falls on the water surface and the runoff from the embankments above water surface elevation. Limited area sites handling only the "first flush" volume shall have a minimum capacity to store 0.5 inch of runoff volume from the entire drainage area.
- Wetland Cells: Shape—length to width ratios are to be 4:1 to 10:1. Other dimensions and shapes that provide a more natural landscape appearance that meet treatment requirements can be used. All wetland cells should have level bottoms side-to-side, and nearly level bottoms in the lengthwise direction.
- Depth—maximum permanent water depth shall be 24 inches.
- Outlet—a water control structure to automatically regulate storage release in accordance with the design detention time shall be installed.

- Detention time and surface area—the detention time and surface area shall be calculated on the time required to achieve the required level of treatment based on the limiting contaminant present.

Criteria for Hydrophytic Vegetation

- Vegetation selected for the constructed wetland shall be hydrophytic plants suitable for local climatic conditions and tolerant of the concentrations of nutrients, pesticides, and other constituents in the stormwater or wastewater stream and selected for their treatment potential.
- Preference shall be given to native wetland plants with localized genetic material. Plant materials collected or grown from material collected within a 200-mile radius from the site is considered local.
- Adequate substrate material and site preparation necessary for proper establishment of the selected plant species shall be included in the design.
- Seeding of earthfill material will be in concurrence with the Critical Area Planting (342) specification.

Criteria for Wetland Functions

- A functional assessment (Hydrogeomorphic or similar method) shall be performed on the site prior to construction.

CONSIDERATIONS

Consider effect of volumes and rates of runoff, infiltration, evaporation, and transpiration on the water budget.

Consider the potential for a change in rates of plant growth and transpiration because of changes in the volume of available soil water.

Consider effects on downstream flows or aquifers that would affect other water uses or users.

Consider effects on movement of sediment and soluble and sediment-attached substances carried by runoff.

Consider effects on temperature of water resources to prevent undesired effects on aquatic and wildlife communities.

Consider the effects of the constructed wetland on potential human or wildlife use and/or wildlife use of the constructed wetland (e.g. additional nutrient inputs from waterfowl use, toxic effects on wildlife); de-emphasize the incorporation of additional functions beyond the treatment function where necessary.

Consider the effects on wetlands or water-related resources and fish and wildlife habitats that would be affected by the practice.

PLANS AND SPECIFICATIONS

Specifications for this practice shall be prepared for each site. Specifications shall be recorded using approved specifications sheets, job sheets, narrative statements in the conservation plan, or other documentation.

OPERATION AND MAINTENANCE

The following actions shall be carried out to ensure that this practice functions as intended throughout its expected life. These actions include normal repetitive activities in the

application and use of the practice (operation), and repair and upkeep of the practice (maintenance):

The use of fertilizers, mechanical treatments, prescribed burning, pesticides, and other chemicals to assure the constructed wetland function shall not compromise the intended purpose. Biological control of undesirable plant species and pests (e.g., using predator or parasitic species) shall be implemented where available and feasible.

Timing and level setting of water control structures required for the establishment of desired hydrologic conditions or for management of vegetation shall be outlined in the operation and maintenance plan.

Inspection schedule for embankments and structures for damage assessment.

Depth of sediment accumulation to be allowed before removal is required.

Management needed to maintain vegetation, including control of unwanted vegetation, including noxious weeds, will be conducted. If chemicals are used to control noxious weeds, all chemicals will be applied according to label directions.